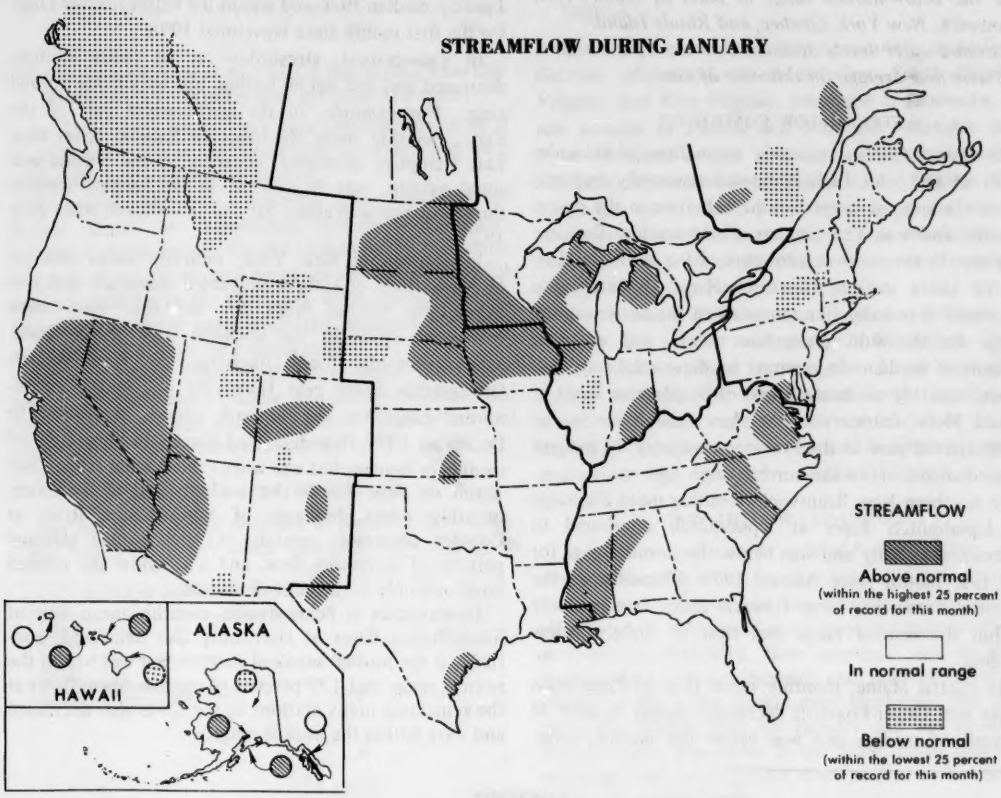
WATER RESOURCES REVIEW for JANUARY 1980

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH



STREAMFLOW AND GROUND-WATER CONDITIONS

Streamflow generally decreased seasonally in Alaska, southern Canada and most northern States of the conterminous 48 States, and generally increased elsewhere, including Hawaii.

Below-normal streamflow persisted in parts of Arizona, British Columbia, Idaho, Montana, Nebraska, Utah, and Washington. Monthly mean flows were lowest of record for the month in parts of Utah.

Flows remained in the above-normal range in parts of Quebec, Alaska, Alabama, Colorado, Illinois, Indiana, Iowa, Kansas, Louisiana, Minnesota, Mississippi, Nebraska, North Dakota, South Carolina, South Dakota, Virginia, and Wisconsin, and increased into that range in parts of Arizona, California, Nevada, and Utah. Monthly or daily mean flows were highest of record for the month in parts of California, Iowa, Nevada, South Dakota, and Wyoming. Flooding occurred in California, Georgia, Hawaii, Minnesota, Mississippi, Nebraska, Nevada, North Carolina, and Texas.

Ground-water levels generally declined and were near average in the Northeast Region. In the Southeast Region, levels rose in Kentucky, Virginia, Mississippi, and Georgia; trends were mixed in other States. Levels were mostly above average. Levels declined in most of the Western Great Lakes Region, but were above average or average. In the Midcontinent Region, trends were mixed, and above and below average. In the West, levels rose in Nevada, declined in Washington and Idaho, and trends were mixed elsewhere. Levels were below average in Washington, Arizona, New Mexico, and most of Idaho, and above and below average in other States.

New high ground-water levels for January were recorded in southern California, Kentucky, and Utah. A new alltime high level was reached in Virginia. New January lows occurred in Arizona, Arkansas, Idaho, Nevada, New Mexico, Utah, and Washington.

NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

Streamflow increased seasonally in Maryland, Delaware, and parts of New Jersey, and generally decreased elsewhere in the region. Monthly mean flows remained above the normal range in parts of Quebec and increased into that range in parts of Maryland. Flows decreased into the below-normal range in parts of Maine, New Brunswick, New York, Quebec, and Rhode Island.

Ground-water levels declined in most of the region, and were near average for this time of year.

STREAMFLOW CONDITIONS

In eastern Quebec, monthly mean flow of Outardes River at Outardes Falls decreased seasonally but was above the normal range for the 5th time in the past 6 months and was 121 percent of the median flow for January. In the southwestern part of the Province, flow at the index station, Harricana River at Amos, also decreased seasonally but remained in the above-normal range for the 9th consecutive month and was 156 percent of median. In contrast to these relatively high flows, monthly mean discharge of St. Maurice River at Grand Mere, tributary to St. Lawrence River in the south-central part of the Province, was only 70 percent of median and below the normal range.

In northern New Brunswick, monthly mean discharge of Upsalquitch River at Upsalquitch continued to decrease seasonally and was below the normal range for the first month since August 1979. Elsewhere in the Atlantic Provinces, mean flows at index stations were within the normal range and near or slightly below median.

In central Maine, monthly mean flow of Piscataquis River near Dover-Foxcroft decreased sharply to only 38 percent of median and was below the normal range. Elsewhere in Maine and in New Hampshire and Vermont, streamflow also decreased seasonally but was within the normal range at all index stations.

In central Massachusetts, mean flow of Ware River at Intake Works near Barre decreased, contrary to the normal seasonal pattern of increasing flow, and was below median for the first time since June 1979 but remained in the normal range.

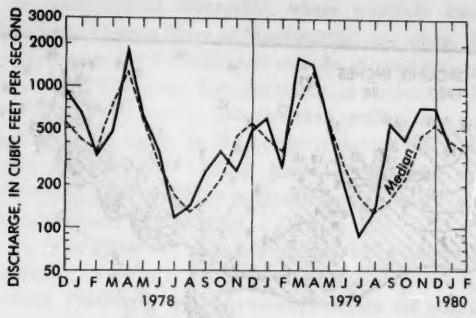
In Rhode Island, monthly mean discharge of Branch River at Forestdale decreased to only 56 percent of the January median flow and was in the below-normal range for the first month since November 1978.

In Connecticut, streamflow at all index stations decreased and was below median but within the normal range. For example, in the southeastern part of the State, monthly mean discharge of Salmon River near East Hampton decreased, contrary to the normal seasonal pattern, was 85 percent of the January median flow, and below median for the first month since July 1979.

In east-central New York, monthly mean flow of Mohawk River at Cohoes decreased seasonally and was below the normal range for the first time since November 1978. In the northern part of the State, where monthly mean discharge of West Branch Oswegatchie River near Harrisville was in the above-normal range for the 4-month period, September to December 1979, flow decreased sharply to 86 percent of median in January but was within the normal range. (See graph on page 3.) In the southern part of the State, monthly mean discharge of Susquehanna River at Conklin decreased, contrary to the normal seasonal pattern of increasing flow, and was below the normal range and only 44 percent of median.

Downstream in Pennsylvania, monthly mean flow of Susquehanna River at Harrisburg also decreased, contrary to the normal seasonal pattern, but was within the normal range and 135 percent of median. Mean flows at the remaining index stations in the State also decreased and were within the normal range.

CONTENTS



Monthly mean discharge of West Branch Oswegatchie River near Harrisville, N.Y. (Drainage area, 258 sq mi; 668 sq km)

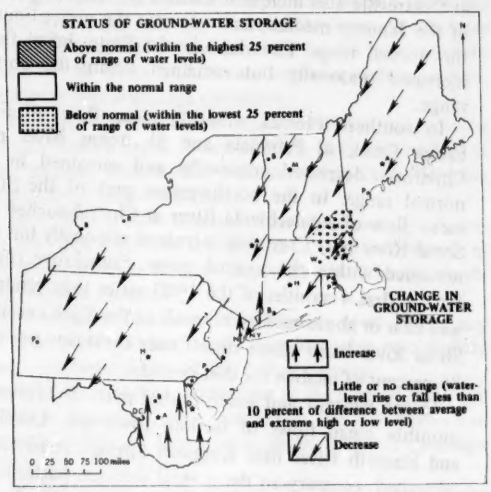
In New Jersey, mean flows were variable, increasing at some index stations and decreasing at others, but were within the normal range at all sites.

In central Maryland, monthly mean discharge of Seneca Creek at Dawsonville increased seasonally, remained above median for the 14th consecutive month, and was above the normal range for the 10th time in the past 12 months. In the Choptank River basin in eastern Maryland, monthly mean discharge increased seasonally and remained within the normal range.

Monthly mean flow of Potomac River near Washington, D.C. increased sharply, as a result of runoff from rains near midmonth, and remained in the above-normal range for the 5th consecutive month.

GROUND-WATER CONDITIONS

Ground-water levels declined in most of the region. (See map.) However, levels changed only slightly in much of New York and New Jersey, and levels rose in parts of southeastern New York (except Long Island), northeastern New Jersey, southern Delaware, and southern Maryland. Levels near end of January throughout the region were about average for this time of year, with only scattered exceptions.



Map shows ground-water storage near end of January and change in ground-water storage from end of December to end of January.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

Streamflow generally increased seasonally in Alabama, Georgia, Mississippi, North Carolina, South Carolina, Virginia, and West Virginia, decreased in Kentucky, and was variable in Florida and Tennessee. Monthly mean flows remained in the above-normal range in parts of Alabama, Mississippi, South Carolina, and Virginia. Mean discharges were above the normal range for the 5th consecutive month in parts of Alabama, Mississippi, and South Carolina. Minor flooding was reported in parts of Georgia, Mississippi, and North Carolina.

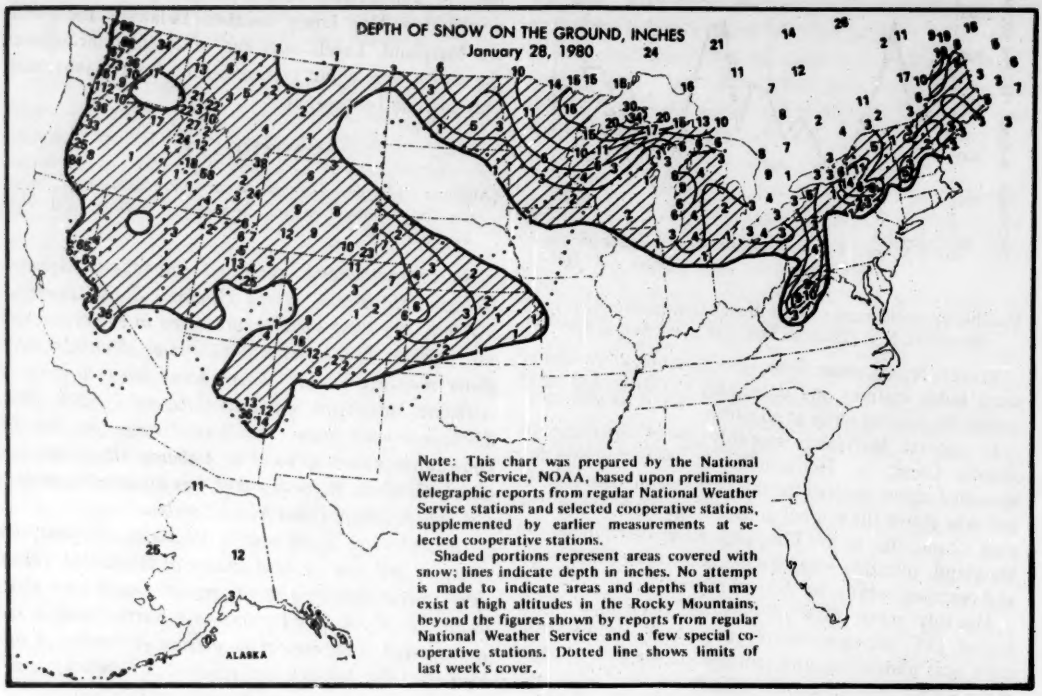
Ground-water levels rose in Kentucky, Virginia, and Georgia, and rose or held steady in Mississippi. Trends were mixed elsewhere in the region. Levels were above average in Kentucky, Virginia, and North Carolina, and were mixed with respect to average elsewhere. A new high level for January was reached in Kentucky, and a new alltime high occurred in northern Virginia.

STREAMFLOW CONDITIONS

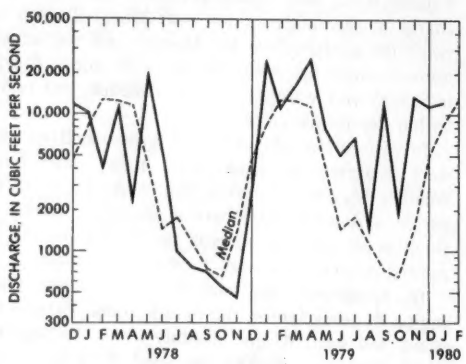
In southern and eastern parts of North Carolina, some lowland flooding along Lumber River at Lumberton and Neuse River at Smithfield, respectively, was reported by the National Weather Service near midmonth. In the west-central Piedmont, flow increased also in South Yadkin River near midmonth and monthly mean discharge at the index station near Mocksville was about twice the median flow for January and was above the normal range. Elsewhere in the State, mean flows also increased and were greater than median but remained within the normal range.

In eastern Georgia, stages on Savannah River at Clyo were reported to have been higher than National Weather Service designated flood stage for an extended period during the latter part of January. Monthly mean flows at all index stations in the State remained in the normal range but generally increased seasonally.

In Mississippi, National Weather Service reported minor flooding late in the month along portions of Big Black and Pearl Rivers. Monthly mean discharge of Big Black River near Bovina decreased from the unusually high flow during December but was 3 times the January median and remained above the normal range for the 5th consecutive month. In the southeastern part of the



State, mean flow of Pascagoula River at Merrill increased seasonally, was 234 percent of median, and remained in the above-normal range for the 11th time in the past 13 months. In northeastern Mississippi, monthly mean discharge of Tombigbee River at Columbus also increased seasonally but was in the normal range. (See graph.)



Monthly mean discharge of Tombigbee River at Columbus, Miss. (Drainage area, 4,490 sq mi; 11,630 sq km)

In northwestern Alabama, monthly mean flow of Tombigbee River at Demopolis lock and dam, near Coatopa increased seasonally, and remained above the normal range for the 5th consecutive month. In the adjacent basin of Cahaba River, monthly mean discharge at Centreville also increased seasonally, was 178 percent of the January median, and was near the upper limit of the normal range. Elsewhere in the State, mean flows increased seasonally but remained within the normal range.

In southern Florida, monthly mean flows of Fish-eating Creek at Palmdale and St. Johns River near Christmas decreased seasonally and remained in the normal range. In the northwestern part of the State, mean flow of Apalachicola River at Chattahoochee and Shoal River near Crestview increased seasonally but also remained within the normal range. Cumulative runoff for the first 4 months of the 1980 water year generally was near or above median in much of the State except in Shoal River basin where runoff near Crestview was only 86 percent of median for that period.

In the western and north-central parts of Tennessee, monthly mean flows of Buffalo River near Lobelville and Harpeth River near Kingston Springs, respectively, decreased, contrary to the normal seasonal pattern, and were in the normal range, following extended periods of above-normal flow at each station. In the eastern part of the State, mean flows increased seasonally and were greater than median, but remained in the normal range.

In south-central Kentucky, where monthly mean discharge of Green River at Munfordville was above the normal range for 5 consecutive months, August through December 1979, mean flow decreased, in contrast to the normal seasonal pattern, was less than median, and was in the normal range. In the northern part of the State, mean discharge of Licking River at Catawba also decreased, contrary to the normal seasonal pattern, and remained in the normal range.

In West Virginia, monthly mean flows increased seasonally in all parts of the State, were greater than the January median flows, and remained within the normal range. In the extreme northern part of the State, cumulative runoff for the first 4 months of the 1980 water year in Potomac River at Paw Paw was 237 percent of the median runoff for that period.

In southeastern Virginia, monthly mean discharge of Nottaway River near Stony Creek increased seasonally, was 3 times median, and was in the above-normal range for the 13th time in the past 14 months. In the northern part of the State, monthly mean flow of Rapidan River near Culpeper also increased seasonally, was nearly twice the January median discharge, and was above the normal range for the 5th time in the past 6 months. In southwestern Virginia, monthly mean discharge of North Fork Holston River near Saltville increased seasonally, was 1½ times median, and was in the above-normal range for the 4th time in the past 5 months.

GROUND-WATER CONDITIONS

In West Virginia, ground-water levels declined in the northern and extreme eastern panhandles and along the Ohio River, and rose elsewhere in the State. Levels were above average in a few counties in the northwestern third of the State and in one extreme eastern county, and were below average elsewhere.

In Kentucky, levels rose and were above average—at or near record highs. A new January high was reached in the artesian observation well in the Jackson Purchase region in 29 years of record.

In Virginia, levels rose and were above average. A new alltime high level was reached, in 22 years of record, in the Sydenstricker Church observation well in the northern Virginia Piedmont.

In western Tennessee, the artesian level in the key well in the "500-foot sand" near Memphis rose slightly but continued nearly 15 feet below average.

In North Carolina, levels rose in the Coastal Plain and western Piedmont, but declined in the mountains and eastern Piedmont. Levels were above long-term averages across the entire State.

In Mississippi, levels rose in the Sparta Sand in the Jackson area, while levels in the Cockfield Formation held steady. Levels in the shallow water-table aquifers continued to rise slightly along the Gulf Coast and in southern Mississippi, while levels in deeper artesian wells indicated no change. In the northern part of the State, levels in the Wilcox and Upper Cretaceous aquifers showed moderate rises. Most wells in the Mississippi River alluvium rose 2 to 3 feet.

In Alabama, the level in the key well in Centreville rose and was above average, and the level in the Montgomery well declined and continued below average by 4 feet.

In Georgia, levels in the Piedmont rose slightly, but in the Coastal Plain they rose 2 to 10 feet. Levels in the water-table aquifer in the Coastal Plain were above average at month's end. In the southwest, levels rose up to 5 feet.

In Florida, levels declined less than a foot in most areas in the north. Levels were 1 to 8 feet above average in the northwest, but were 1 to 5 feet below average in the northeast and in the central peninsula. In southeastern Florida, levels rose slightly in Palm Beach and St. Lucie Counties, but changed little elsewhere.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

Streamflow generally decreased in Ontario, Indiana, Minnesota, and Wisconsin, and was variable in Illinois, Michigan, and Ohio. Monthly mean flows remained in the above-normal range in parts of Illinois, Indiana, Minnesota, and Wisconsin, and increased into that range in parts of Michigan. Flooding occurred in Minnesota.

Ground-water level trends were mixed in Michigan, but generally declined elsewhere in the region. Levels were above average and average in Indiana and Ohio, respectively, and were mixed with respect to average in Minnesota and Michigan.

STREAMFLOW CONDITIONS

In southeastern Minnesota, minor flooding occurred along the lower reaches of Root River and South Fork Root River January 17, 18, as a result of unseasonally warm weather, runoff from light rain, and jamming of floating ice. In the southwestern part of the State, monthly mean flow of Minnesota River near Jordan decreased seasonally but was 4 times the January median discharge, and remained in the above-normal range for the 9th time in the past 10 months, as a result of high carryover flow from December. In the adjacent basin of Des Moines River, the mean discharge of 420 cfs at Jackson (drainage area, 1,220 square miles) was highest for the month since records began in 1936, also as a result of high carryover flow from December. This was the 3d consecutive month of record-high monthly mean discharge at this station. In the central part of the State,

(Continued on page 7.)

SELECTED DATA FOR THE GREAT LAKES, GREAT SALT LAKE, AND OTHER HYDROLOGIC SITES

GREAT LAKES LEVELS

Water levels are expressed as elevations in feet above International Great Lakes Datum 1955

(Data furnished by National Ocean Survey, NOAA, via U.S. Army Corps of Engineers office in Detroit. To convert data to elevations above mean sea level datum of 1929, add the following values: Superior, 0.96; Michigan-Huron, 1.20; St. Clair, 1.24; Erie, 1.57; Ontario, 1.22.)

Lake	January 31, 1980	Monthly mean, January		January		
		1980	1979	Average 1900–75	Maximum (year)	Minimum (year)
Superior (Marquette, Mich.)	600.63	600.69	600.12	600.34	601.33 (1975)	598.58 (1926)
Michigan and Huron (Harbor Beach, Mich.)	579.22	579.27	578.43	577.72	579.92 (1973)	575.39 (1965)
St. Clair (St. Clair Shores, Mich.)	574.64	574.72	574.03	572.51	575.37 (1974)	569.86 (1936)
Erie (Cleveland, Ohio)	571.62	571.76	570.46	569.74	572.39 (1973)	567.62 (1935)
Ontario (Oswego, N.Y.)	244.37	244.19	244.23	243.99	246.10 (1946)	241.67 (1935)

GREAT SALT LAKE

Alltime high: 4,211.6 (1873). Alltime low: 4,191.35 (October 1963).	January 31, 1980	January 31, 1979	Reference period 1904–79		
			January average, 1904–79	January maximum (year)	January minimum (year)
Elevation in feet above mean sea level:	4,198.25	4,198.75	4,198.10	4,204.40 (1924)	4,191.90 (1964)

LAKE CHAMPLAIN, AT ROUSES POINT, N.Y.

Alltime high (1827–1979): 102.1 (1869). Alltime low (1939–1979): 92.17 (1941).	January 30, 1980	January 31, 1979	Reference period 1939–78		
			January average, 1939–78	January max. daily (year)	January min. daily (year)
Elevation in feet above mean sea level:	95.19	95.62	95.36	98.37 (1974)	93.56 (1948)

FLORIDA

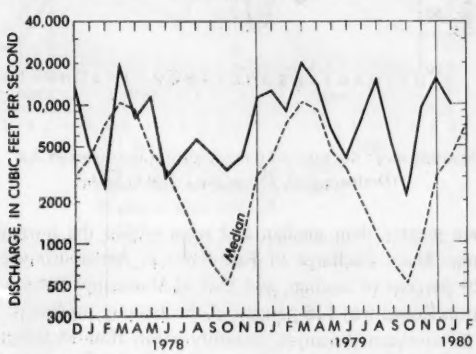
Site	January 1980		December 1979	January 1979
	Discharge in cfs	Percent of normal	Discharge in cfs	Discharge in cfs
Silver Springs near Ocala (northern Florida)	800	102	845	750
Miami Canal at Miami (southeastern Florida)	100	42	135	398
Tamiami Canal outlets, 40-mile bend to Monroe	178	524	334	58

(Continued from page 5.)
monthly mean discharge of Crow River at Rockford decreased seasonally, was about 4 times the January median, and remained above the normal range for the 9th time in the past 10 months, and the 13th time in the past 16 months. Cumulative runoff during the first 4 months of the 1980 water year at this station was 442 percent of the median for that period.

In southwestern Wisconsin, monthly mean discharge of Wisconsin River at Muscoda increased and remained in the above-normal range. In the north-central part of the State, monthly mean flow of Oconto River near Gillett decreased seasonally, was about 1½ times the median discharge for January, and was above the normal range for the 10th time in the past 11 months. Elsewhere in the State, monthly mean flows decreased and were in the normal range.

In northern Illinois, monthly mean flows in Pecatonica River at Freeport and Rock River near Joslin increased seasonally and remained in the above-normal range. In the central part of the State, mean discharge of Sangamon River at Monticello decreased, contrary to the normal seasonal pattern of increasing flow, was below the normal range, and was only 11 percent of the January median flow for that station. In southern Illinois, mean flow of Skillet Fork at Wayne City also decreased, in contrast to the normal seasonal pattern, but remained within the normal range.

In southern Indiana, mean flow of East Fork White River at Shoals decreased from the unusually high flow of December but remained in the above-normal range for the 7th consecutive month. (See graph.) In the western part of the State, monthly mean discharge of Wabash River, as measured at Mt. Carmel, Ill., decreased similarly, and was in the normal range for the first time in 7 months, having remained in the above-normal range from July through December, 1979. In northeastern Indiana, monthly mean flow of Mississinewa River at Marion decreased sharply, contrary to the normal seasonal pattern, was only 58 percent of median, and was in the normal range.



Monthly mean discharge of East Fork White River at Shoals, Ind. (Drainage area, 4,927 sq mi; 12,761 sq km)

In northwestern and central parts of Ohio, monthly mean flows of Maumee River at Waterville and Scioto River at Higby, respectively, decreased into the normal range but were greater than median. In the northeastern part of the State, mean discharge of Little Beaver Creek near East Liverpool increased seasonally but remained within the normal range. Storage in reservoirs in the Mahoning River basin upstream from Newton Falls was 12 percent less than at the end of December, 10 percent more than a year ago, and 39 percent of capacity. Storage in reservoirs in the Scioto River basin upstream from Higby was 10 percent less than last month, 2 percent less than a year ago, and 82 percent of capacity.

In Michigan's Upper Peninsula, monthly mean flow of Sturgeon River near Sidnaw decreased seasonally but was in the above-normal range as a result of high carryover flow from December, augmented by increased runoff from rain and melted snow near midmonth. In the northern part of the Lower Peninsula, monthly mean discharge of Muskegon River at Evart increased sharply, in contrast to the normal seasonal pattern of decreasing flow, and was in the above-normal range for the first time since May 1979. Monthly mean level of Crooked Lake near Conway was 0.24 foot below normal for the month, but mean levels of Houghton Lake near Houghton Lake Heights and Lake Mitchell-Cadillac at Cadillac were 0.11 foot and 0.05 foot, respectively, above normal for the month. In the southern part of the Lower Peninsula, mean discharge of Red Cedar River at East Lansing decreased, contrary to the normal seasonal pattern of flow at that site, but was greater than median and remained within the normal range.

In southeastern Ontario, monthly mean flow of Saugeen River at Port Elgin decreased seasonally and was in the normal range. Similarly, in the eastern and western parts of the Province, mean discharges of Missinaibi River at Mattice and English River at Umfreville, respectively, decreased seasonally, were greater than median, and remained within the normal range.

GROUND-WATER CONDITIONS

Ground-water levels in shallow water-table wells in Minnesota declined but continued above average in the south but were slightly below average in the north. In the Minneapolis-St. Paul area, artesian levels continued to rise in wells tapping the Prairie du Chien-Jordan and the deeper Mt. Simon-Hinckley aquifers, and continued above average in both.

In Wisconsin, levels declined across most of the State during January. Eleven of the twelve observation wells showed declines; the level in one well rose slightly.

Levels in Michigan rose generally in the Lower Peninsula but declined in the Upper Peninsula. Levels were generally below average in most of the Lower Peninsula, and above average elsewhere.

In Illinois, the level in the shallow water-table well in glacial drift at Princeton, Bureau County, rose 1¼ feet and continued above average by more than 3½ feet.

In Indiana, levels declined gradually during January but were slightly above average at month's end.

Levels declined in Ohio, but continued about average for January.

MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

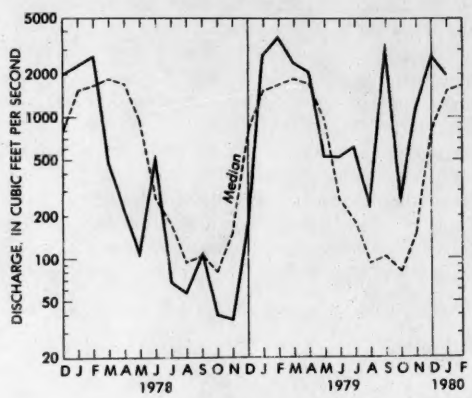
Streamflow decreased in Saskatchewan, North Dakota, South Dakota, and Iowa, and was variable elsewhere in the region. Monthly mean flows remained in the above-normal range in parts of Iowa, Kansas, Louisiana, Nebraska, North Dakota, and South Dakota. Mean flows remained in the below-normal range in parts of Nebraska. Monthly mean discharge was highest for the month in parts of South Dakota, and daily mean discharge was highest for the month in parts of Iowa. Flooding occurred in Texas and Nebraska.

Ground-water levels declined slightly in North Dakota; trends were mixed elsewhere in the region. Levels were above average in Iowa, slightly below average in North Dakota, and well below average, with a new January low, in Arkansas; levels were above and below average in other States.

STREAMFLOW CONDITIONS

Minor lowland flooding was reported by the National Weather Service to have occurred in the southeastern and the Coastal Bend parts of Texas during the latter part of the month as a result of runoff from several periods of rainfall of 2 inches or more. Monthly mean flows of streams in the central part of the Coastal Bend were above the normal range. In the upper reaches of the Canadian, Red, and Brazos Rivers, in northern Texas, monthly mean flows were below the normal range. Elsewhere in the State, mean discharges at index stations were greater than the respective January median flows for those sites and were in the normal range.

In the Amite River basin, in southeastern Louisiana and the adjacent area of southwestern Mississippi, monthly mean discharge of Amite River near Denham Springs, La. increased sharply, as a result of runoff from rains near midmonth, and was above the normal range. Also in the southeastern part of the State, stages on Pearl River near Bogalusa were reported to have been above the National Weather Service designated stage of 15 feet except January 5–10. Monthly mean flow at that station remained in the above-normal range for the 13th consecutive month, and cumulative runoff for the first 4 months of the 1980 water year was 308 percent of median for that period. Mean flow of Paw Paw Bayou near Greenwood, in northwestern Louisiana, also was in the above-normal range. In the southwestern part of the State, mean flow of Calcasieu River near Oberlin decreased into the normal range following 6 consecutive months of mean flow in the above-normal range. (See graph.) Elsewhere in the State, monthly mean flows



Monthly mean discharge of Calcasieu River near Oberlin, La.
(Drainage area, 753 sq mi; 1,950 sq km)

were greater than median and were within the normal range. Mean discharge of Red River at Alexandria was 120 percent of median, and that of Mississippi River at Baton Rouge was 126 percent of the January median.

In southern Arkansas, monthly mean flow of Saline River near Rye increased seasonally, was 192 percent of median, but was in the normal range. In the northern part of the State, mean flow of Buffalo River near St. Joe decreased sharply, contrary to the normal seasonal pattern of increasing flow, was only 48 percent of the January median, but remained in the normal range.

In southwestern Oklahoma, monthly mean discharge of Washita River near Durwood increased, as a result of runoff from rains during the latter part of the month,

but remained below median for the 4th time in the past 5 months. Cumulative runoff at this station for the first 4 months of the 1980 water year was only 48 percent of median. Elsewhere in the State, streamflow was reported to be less than median for the month.

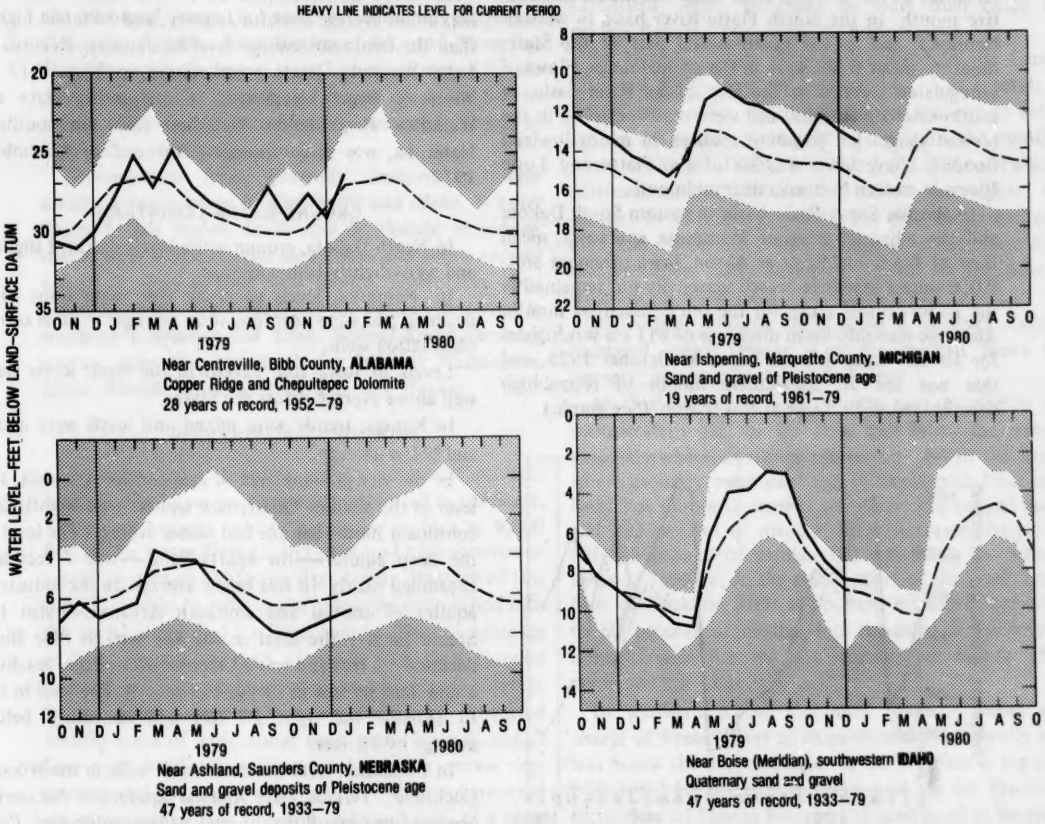
In southern Kansas, monthly mean discharge of Arkansas River at Arkansas City decreased slightly but remained above the normal range for the 3d consecutive month. In the northwestern part of the State, mean flow of Saline River near Russell increased, contrary to the normal seasonal pattern, as a result of runoff from rains January 19–21, but was only 64 percent of median. Cumulative runoff at this station for the first 4 months of the 1980 water year was about ½ of the median cumulative runoff for that period. In north-central Kansas, monthly mean discharge of Little Blue River near Barnes also increased, was 131 percent of median, and remained in the normal range.

In northwestern Missouri, monthly mean flow of Grand River near Gallatin decreased, contrary to the normal seasonal pattern, and was only 40 percent of the January median. Cumulative runoff for the first 4 months of the 1980 water year was only 25 percent of median. In the south-central part of the State, mean discharge of Gasconade River at Jerome increased seasonally and remained within the normal range for the 5th consecutive month but was less than median.

In Iowa, where monthly mean flows at all index stations were above the normal range in December, mean discharge decreased at all stations in January but remained above the normal range. In the north-central part of the State, the daily mean discharge of 2,160 cfs on the 17th in Des Moines River at Fort Dodge (drainage area, 4,190 square miles) was highest for January in 48 years of record. The monthly mean discharge at Fort Dodge (1,174 cfs) was only 2 percent less than the maximum of

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

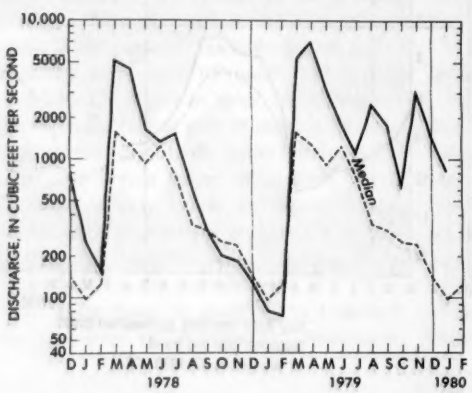
UNSHADED AREA INDICATES RANGE BETWEEN HIGHEST AND LOWEST RECORD FOR THE MONTH
DOTTED LINE INDICATES AVERAGE OF MONTHLY LEVELS, IN PREVIOUS YEARS
HEAVY LINE INDICATES LEVEL FOR CURRENT PERIOD



record for January, and was in the above-normal range for the 10th time in the past 11 months. This was the 3d consecutive month of record-high flows at Fort Dodge, reflecting the record-high flows in the headwaters area in southwestern Minnesota. Cumulative runoff at this station for the first 4 months of the 1980 water year was 9 times the median cumulative runoff for that period. In southwestern Iowa, monthly mean flow of Nishnabotna River above Hamburg decreased, contrary to the normal seasonal pattern, but was 200 percent of the median flow for January and remained in the above-normal range for the 3d consecutive month. In eastern Iowa, mean discharge of Cedar River at Cedar Rapids also decreased, was 3½ times the January median, and was above the normal range for the 3d consecutive month.

In northeastern Nebraska, mean discharge of Elkhorn River at Waterloo decreased seasonally but remained in the above-normal range for the 3d consecutive month as a result of high carryover flow from December, augmented by increased runoff from melted snow near midmonth. In the northwestern part of the State, monthly mean flow of Niobrara River above Box Butte Reservoir increased, contrary to the normal seasonal pattern, but remained in the below-normal range for the 3d consecutive month. In the North Platte River basin in western Nebraska, and in the north-central part of the State, monthly mean flows were in the normal range. Flows of unregulated streams in the Republican River basin, in southwestern Nebraska, also were reported to be in the normal range. Ice jamming resulted in minor lowland flooding along lower reaches of the Platte and Loup Rivers in eastern Nebraska near midmonth.

In the Big Sioux River basin in eastern South Dakota and the adjacent areas of Minnesota and Iowa, mean flow of Big Sioux River at Akron, Iowa (drainage area, 9,030 square miles) decreased seasonally but remained in the above-normal range for the 6th consecutive month. Also, the monthly mean discharge of 811 cfs was highest for January since records began in October 1928, and this was the 3d consecutive month of record-high monthly mean discharge at this station. (See graph.)



Monthly mean discharge of Big Sioux River at Akron, Iowa
(Drainage area, 9,030 sq mi; 23,390 sq km)

In eastern North Dakota, monthly mean flow of Red River of the North at Grand Forks decreased seasonally but remained above the normal range for the 3d consecutive month and for the 8th time in the past 10 months, reflecting the effects of inflow of water released from storage in lakes in Minnesota. In the southwestern part of the State, mean discharge of Cannonball River at Breien also decreased seasonally but was 584 percent of median and remained in the above-normal range for the 7th consecutive month and for the 9th time in the past 10 months. The cumulative runoff at this station for the first 4 months of the 1980 water year was 233 percent of median.

In southeastern Saskatchewan, monthly mean flow of Qu'Appelle River near Lumsden decreased and remained below median for the 3d consecutive month, but was in the normal range.

In southeastern Manitoba, the level of Lake Winnipeg at Gimli averaged 713.55 feet above mean sea level for the month, 0.01 foot lower than last month, 0.48 foot lower than last January, 0.41 foot higher than the long-term mean for January, 2.50 feet lower than the maximum average level for January, and 3.86 feet higher than the minimum average level for January. Records of Lake Winnipeg levels were started in May 1913 at Winnipeg Beach. Reporting of streamflow data for Waterhen River below Waterhen Lake, in southern Manitoba, was discontinued at the end of December, 1979.

GROUND-WATER CONDITIONS

In North Dakota, ground-water levels declined slightly and were slightly below average.

In Nebraska, levels generally rose, with some slight declines, and were near long-term averages in most of the observation wells.

Levels in Iowa rose except in the west; levels were well above average across the State.

In Kansas, trends were mixed and levels were above and below average.

In the rice-growing area of east-central Arkansas, the level in the shallow Quaternary aquifer rose slightly but continued more than 6½ feet below average. The level in the deep aquifer—the Sparta Sand—rose 3 feet but continued nearly 18 feet below average. In the industrial aquifer of central and southern Arkansas—also the Sparta Sand—the level in the key well at Pine Bluff declined 5½ feet and was 33 feet below average, reaching a new January low in 21 years of record. The level in the El Dorado well rose 2½ feet and continued below average by 5½ feet.

In Louisiana, level trends in most wells in the Wilcox, Cockfield, Terrace, and Alluvial aquifers of the northern area indicated the normal winter-spring rise. Continued regional declines occurred in the Sparta Sand and Miocene aquifers. Levels continued seasonal recoveries in

the Chicot aquifer in the southwest. Levels in most wells in the southeast rose, and levels in wells in the "600-foot sand" of the Baton Rouge area rose 12 to 28 feet.

In Texas, artesian levels in the key wells in the Edwards aquifer declined at Austin and rose at San Antonio; they were above average in both localities. The artesian level in the key well in the Evangeline aquifer at Houston rose but was below average.

WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

Streamflow decreased seasonally in Alberta, British Columbia, and Montana, and generally increased in Arizona, California, Idaho, Nevada, Oregon, and Utah. Elsewhere, flows were variable. Monthly mean flows remained in the below-normal range in parts of British Columbia, Arizona, Idaho, Montana, Utah, and Washington, and decreased into that range in parts of Alberta, Colorado, and Wyoming. Mean flows increased into the above-normal range in parts of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming. Monthly mean discharges were highest of record for the month in parts of Nevada and lowest of record for the month in parts of Utah. Flooding occurred in parts of California and Nevada.

Ground-water levels generally declined and were mostly below average in Washington and Idaho. In other States in the region, levels rose in Nevada; elsewhere, trends were mixed. Levels were above and below average except in Arizona and New Mexico, where they were below average. New high levels for January occurred in southern California and Utah. Several States recorded one or more new high levels for January: Washington, Idaho, Nevada, Utah, Arizona, and New Mexico.

STREAMFLOW CONDITIONS

A major tropical storm system entered California January 8 bringing large amounts of rainfall to the State. The storm brought rain to elevations as high as 9,000 feet in the Sierra Nevada, and produced high volumes of runoff in central California river basins. Because of this runoff, storage in most major reservoirs encroached into the portions reserved for flood control. The combination of high streamflows and unusually high tides coupled with 30–35 mile-per-hour winds caused failure of levees in the Sacramento-San Joaquin Delta. An estimated 10,000 acres of agricultural lands were flooded, and at least 500 head of cattle were lost. One person was missing and presumed drowned. At monthend, another storm system caused flooding and mudslides in a large area from Los Angeles to the California-Mexico boundary. At the Tijuana River near Nestor (drainage area, 1,695 square miles), the peak discharge of 35,000 cfs on January 30 was highest in 45 years of record and exceeded the previous record peak of 17,700 cfs that occurred at that site on February 7, 1937. Streamflow was above the normal range at all index stations in the State except along the extreme north coast, where flow was within the normal range. Combined contents of 10 major reservoirs in northern California were 115 percent of average and 110 percent of the contents one year ago.

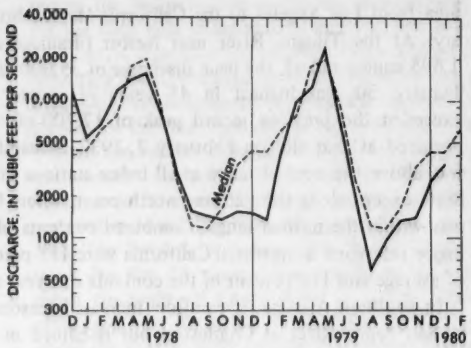
In southern Arizona, streamflow increased seasonally in San Pedro River at Charleston but remained in the below-normal range for the 3d consecutive month and was 75 percent of median. In the west-central part of the State, monthly mean discharge of Verde River below Tangle Creek, above Horseshoe Dam increased sharply to 562 percent of median and was above the normal range for the first time since June 1979. In northwestern Arizona and the adjacent areas of Nevada and Utah, monthly mean discharge of Virgin River, as measured at Littlefield, Ariz., increased to more than twice the median flow and was above the normal range.

In Nevada, minor flooding occurred in the Carson City and Reno areas on January 14, 15 as a result of runoff from rains, melting snow, and inadequate drainage. In the north-central part of the State, the monthly mean discharge of 649 cfs in Humboldt River at Palisade (drainage area, 5,010 square miles) was highest for January in 73 years of record. The daily mean discharge of 2,250 cfs on the 14th was only 20 percent less than the maximum daily mean of record for the month, which occurred in 1914.

In Oregon, monthly mean flows at all index stations increased, were greater than the median flows for January, and were in the normal range.

In Washington, streamflow was near median in the southwestern part of the State and below the normal range elsewhere. In the northwestern part of the State, where monthly mean discharge of Skykomish River near Gold Bar during December was above the normal range and 223 percent of median, flow decreased sharply to only 65 percent of median and was below the normal range in January. In the eastern part of the State, mean flow of Spokane River at Spokane increased seasonally to 80 percent of median but remained in the below-normal range for the 8th consecutive month. (See graph on page 12.)

In southern British Columbia, monthly mean discharge of Fraser River at Hope decreased seasonally and was below the normal range for the 5th time in the past 6 months. In the northwestern part of the Province, mean flow of Skeena River at Usk continued to decrease



Monthly mean discharge of Spokane River at Spokane, Wash. (Drainage area, 4,290 sq mi; 11,100 sq km)

seasonally and remained in the below-normal range for the 3d consecutive month.

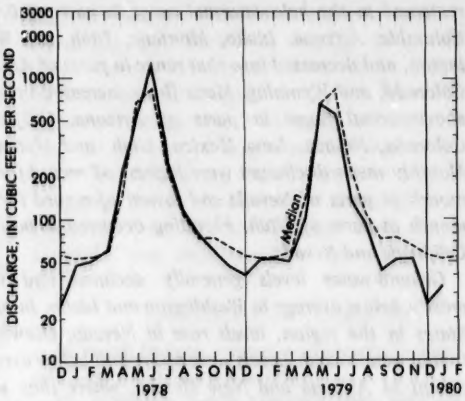
In southwestern Alberta, streamflow continued to decrease seasonally in Bow River at Banff and was below the normal range for the 9th time in the past 11 months. Cumulative runoff for the first 4 months of the 1980 water year was 80 percent of median. Reporting of streamflow data for Athabasca River at Hinton, in west-central Alberta, was discontinued at end of December 1979.

In north-central Idaho, where mean flow of Salmon River at White Bird had been below the normal range for 7 consecutive months, through December, flow increased to 93 percent of median and was within the normal range during January. In the southeastern part of the State, monthly mean discharge of Snake River near Heise (adjusted for storage) remained in the below-normal range for the 8th consecutive month. Streamflow elsewhere in the State was generally in the normal range. Reservoir storage for irrigation in eastern Idaho was near average, while other reservoirs were generally below average.

In Montana, west of the Continental Divide, monthly mean discharge of Clark Fork at St. Regis continued to decrease seasonally and remained in the below-normal range for the 8th consecutive month. Also in northwestern Montana, but east of the Divide, mean flow of Marias River near Shelby decreased to 72 percent of median, and was below the normal range for the 6th time in the past 7 months. Elsewhere in Montana, mean flows at index stations decreased seasonally, were less than median, but within the normal range.

In northern Wyoming, monthly mean flow of Tongue River near Dayton continued to decrease seasonally and was below the normal range. In the southern part of the State, mean flow of North Platte River above Seminoe Reservoir, near Sinclair (drainage area, 8,134 square miles), increased, contrary to the normal seasonal pattern of decreasing flow, and was above the normal range. The daily mean discharge of 700 cfs on January 17 was highest for the month in 41 years of record.

In Utah, monthly mean flows generally decreased in all parts of the State, contrary to the normal seasonal pattern. In the northeastern part of the State, however, mean flow of Whiterocks River near Whiterocks continued to decrease seasonally and remained in the below-normal range for the 6th consecutive month. Also in northeastern Utah, mean flow of Weber River near Oakley (drainage area, 163 square miles) increased but remained in the below-normal range for the 5th consecutive month. The monthly mean discharge of 33.7 cfs near Oakley was lowest for the month in 76 years of record. (See graph.) In contrast to these low flows,



Monthly mean discharge of Weber River near Oakley, Utah (Drainage area, 163 sq mi; 422 sq km)

monthly mean discharge of Colorado River near Cisco, in east-central Utah, increased to 124 percent of median and was above the normal range. Elsewhere in the State, mean flows at index stations were near or slightly above median but within the normal range.

Contents of the Colorado River Storage Project decreased 139,000 acre-feet during the month.

West of the Continental Divide in southwestern Colorado, mean flow of Animas River at Durango decreased seasonally to 81 percent of median, and was below the normal range for the 3d time in the past 4 months. In central Colorado, also west of the Divide, flow of Roaring Fork River at Glenwood Springs decreased seasonally but remained in the above-normal range for the 3d consecutive month. Also in central Colorado but east of the Continental Divide, mean flow of Bear Creek at Morrison increased sharply to 223 percent of median and was in the above-normal range for the first time since June 1979.

In northern New Mexico, mean flow of Rio Grande below Taos Junction Bridge, near Taos, increased to 106 percent of median and was in the normal range, after 3 consecutive months of flow in the below-normal range. Also in the northern part of the State, monthly mean discharge of Pecos River near Pecos decreased seasonally but was above the normal range for the first time since July 1979. In southeastern New Mexico, mean flow of Delaware River near Red Bluff decreased seasonally, was 242 percent of median, and remained in the above-normal range for the 3d consecutive month.

GROUND-WATER CONDITIONS

In Washington, ground-water levels declined and were below average in both the eastern and western observation wells. A new low for January was reached in the Spokane well in the eastern part of the State, in 38 years of record.

In Idaho, the level in the well penetrating the sand and gravel aquifer in the Boise Valley declined slightly but continued slightly above average. Levels in the key wells representative of the Snake River Plain aquifer continued to decline, reaching new January lows in wells in the eastern, south-central, and southwestern parts, in 31, 30, and 23 years of record, respectively. The level declined and was below average in the well in the western part of the aquifer.

In Montana, the level in the water-table observation well at Hamilton Fairgrounds declined nearly half a foot and was nearly half a foot below average. The water-table well at Missoula declined more than 2 feet since the last measurement was made near the end of November; the level continued slightly below average.

In southern California, the level in the key well in Los Angeles County, in the San Gabriel River basin, continued to decline and continued below average. In Orange County, in the Los Alamitos area, the level in the key well rose over 5 feet but continued below average. In Santa Barbara County, the level in the key well in Santa Ynez Valley declined and was below average; the level in the key well in Santa Maria Valley rose over 2 feet and continued well above average. The level in the key well at Cuyama in the Upper Cuyama Valley continued to decline but posted a new month-end high, in 30 years of record, for the eighth consecutive month.

In Nevada, the level in the key well in Las Vegas Valley rose more than 3 feet; despite the rise in level, it was at a new low for January in 31 years of record. The level in the well at Truckee Meadows rose but continued below average. Levels in the wells at Steptoe Valley and Paradise Valley rose and continued above average.

In Utah, levels in key wells rose but were below average in the Holladay and Flowell areas. Despite the net rise in the Holladay well, the level was at a new January low in 32 years of record. Levels in key wells declined but were above average in the Logan and Blanding areas; the level in the Blanding well was at a new January high in 20 years of record.

Water levels in Arizona rose in three key wells and declined in two. New lows for January were recorded in three of the wells, including the well in the Elfrida area, with 29 years of record.

In New Mexico, levels rose seasonally in three of the key wells, but continued to decline in the Dayton water-table well, in the southern part of the Roswell basin, reaching a new January low in 42 years of record.

ALASKA

Streamflow decreased seasonally at all index stations in the State. Mean flows remained in the above-normal range for the 4th consecutive month at Little Susitna River near Palmer and Kenai River at Cooper Landing as a result of high carryover flow from December, augmented by runoff from snowmelt in Little Susitna River basin late in the month. Cumulative runoff during that 4-month period at the station near Palmer was 187 percent of median, and at Cooper Landing, was 280 percent of median. In southeastern Alaska, monthly mean flow of Gold Creek at Juneau decreased seasonally but remained in the normal range and was greater than median. In the interior part of the State, mean discharge of Chena River at Fairbanks decreased from the normal range into the below-normal range and was only 68 percent of median. Also in the interior, monthly mean flow of Tanana River at Nenana decreased and was less than median but remained within the normal range.

Ground-water levels in wells tapping confined aquifers in the Anchorage area generally fluctuated less than 1 foot from December levels. However, increased pumping lowered levels over 2 feet in the Campbell Creek fan. In the Fairbanks area, water levels in the Chena-Tanana basin were in the normal range and slightly higher than a year ago.

HAWAII

Streamflow increased sharply at index stations on the Islands of Kauai, Maui, and Oahu, as a result of runoff from the intense rains during the very severe storm of January 7–8. Total damage was estimated at 27.5 million dollars and the entire State was declared a disaster area. Monthly mean flow of Kalihi Stream near Honolulu, Island of Oahu, increased into the above-normal range and was 320 percent of the January median discharge. Similarly, mean flow of Honopou Stream near Huelo, Island of Maui, also increased into the above-normal range and was 1½ times median. On the Island of Kauai, where monthly mean flow of East Branch of North Fork Wailua River near Lihue was in the below-normal range in December, mean discharge increased into the normal range but was only 76 percent of median. Cumulative runoff at this station for the first 4 months of the 1980 water year was only 53 percent of median. On the Island of Hawaii, monthly mean flow of Waiakea Stream near Mountain View decreased sharply, was only 16 percent of median, and was below the normal range.

On Guam, Mariana Islands, monthly mean flow of Ylig River near Yona decreased seasonally, was 80 percent of median, and remained in the normal range.

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR JANUARY AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	January data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean, in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at	*1980	7,550	90	108	2,270	1,720	3,190	3.5	2.5	5.0
	Trenton, N.J.	1945–79	13,770	62	201	.....	998	20,800	.....	0	7.5
	(Morrisville, Pa.)	(Extreme yr)		(1951, 1960)	(1959)		(1965)	(1976)			
			[c]10,240								
04264331	St. Lawrence River at	1980	253,500	166	168	113,000	98,700	139,000	1.0	0	3.0
	Cornwall, Ontario, near	1976–79	235,200	166	168	106,000	90,000	128,000	0.5	0	2.0
	Massena, N.Y.	(Extreme yr)		(1976–78)	(1976–77, 1979)		(1977, 1979)	(1978)			
	median streamflow at Ogdensburg, N.Y.		[c]223,000								
	SOUTHEAST										
07289000	Mississippi River at	1980	667,700	194	223	372,000	304,000	438,000	8.5	7.0	9.0
	Vicksburg, Miss.	1976–79	640,800	157	246	331,000	138,000	501,000	2.5	0	6.5
		(Extreme yr)		(1979)	(1978)		(1977)	(1978)			
			[c]535,400								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam	**1980	422,000	193	217	.....	174,000	310,000	.....	6.0	6.0
	53, near Grand Chain, Ill.	1955–79	368,100	98	382	.....	28,500	448,000	.....	0	10.0
	(25 miles west of Paducah,	(Extreme yr)		(1973)	(1964)		(1956)	(1970)			
	Ky.; streamflow station		[c]315,300								
	at Metropolis, Ill.)										
	MIDCONTINENT										
06934500	Missouri River at Hermann,	1980	41,600	418	465	49,900	26,400	68,800	4.0	3.0	4.5
	Mo. (60 miles west of St.	1976–79	32,550	159	553	37,300	26,700	53,700	0	0	4.5
	Louis, Mo.)	(Extreme yr)		(1976)	(1977)		(1976)	(1976)			
			[c]32,940								
	WEST										
14128910	Columbia River at	1980	152,000	92	111	41,900	30,700	60,900	4.1	2.0	6.0
	Warrendale, Oreg.	1976–79	167,200	76	114	42,800	24,300	67,400	3.5	0	8.0
	(streamflow station	(Extreme yr)		(1978)	(1979)		(1979)	(1979)			
	at The Dalles, Oreg.)		[c]112,300								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1941–70, for comparison with data for current month.
*Dissolved solids and water temperatures are for 17 days only (Jan. 1–17).
**Water temperatures are for 19 days only (Jan. 1–19).

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF JANUARY 1980

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F Flood control I Irrigation M Municipal P Power R Recreation W Industrial	End of Dec. 1979	End of Jan. 1980	End of Jan. 1979	Average for end of Jan.	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	68	67	49	51	226,300 (a)
QUEBEC					
Allard (P)	77	65	53	43	280,600 ac-ft
Gouin (P)	89	82	51	55	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	56	42	41	49	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	63	51	26	36	3,330 mcf
Lake Francis (FPR)	71	57	62	51	4,326 mcf
Lake Winnipesaukee (PR)	75	66	62	57	7,220 mcf
VERMONT					
Harriman (P)	75	58	21	46	5,060 mcf
Somerset (P)	68	57	78	59	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	79	76	74	70	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	49	37	47	44	34,270 mcf
Indian Lake (FMP)	85	66	48	53	4,500 mcf
New York City reservoir system (MW)	88	85	84	.....	547,500 mg
NEW JERSEY					
Wanaque (M)	98	106	92	77	27,730 mg
PENNSYLVANIA					
Allegheny (FPR)	24	18	12	23	51,400 mcf
Pymatuning (FMR)	86	84	94	83	8,191 mcf
Raystown Lake (FR)	68	66	69	48	33,190 mcf
Lake Wallenpaupack (PR)	72	62	65	52	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	100	100	98	87	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	91	83	82	78	12,580 mcf
Narrows (Badin Lake) (P)	93	100	100	97	5,616 mcf
High Rock Lake (P)	45	87	96	70	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	74	83	82	63	70,300 mcf
Lakes Marion and Moultrie (P)	63	71	69	68	81,100 mcf
SOUTH CAROLINA—GEORGIA					
Clark Hill (FP)	62	70	53	59	75,360 mcf
GEORGIA					
Burton (PR)	82	68	74	56	104,000 ac-ft
Sinclair (MPR)	95	100	75	80	214,000 ac-ft
Lake Sidney Lanier (FMPR)	62	64	47	53	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	71	74	72	68	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	35	43	52	35	1,156,000 cfsd
Douglas Lake (FPR)	12	12	17	13	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	39	43	50	42	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	44	46	47	33	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	51	45	55	40	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	69	58	54	42	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	67	49	40	33	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	23	21	21	21	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	87	85	80	83	22,700,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	92	93	95	74	127,600 ac-ft
Bell Fourche (I)	41	46	66	48	185,200 ac-ft
Lake Francis Case (FIP)	54	62	65	65	4,834,000 ac-ft
Lake Oahe (FIP)	82	81	83	.....	22,530,000 ac-ft

Reservoir Principal uses: F Flood control I Irrigation M Municipal P Power R Recreation W Industrial	End of Dec. 1979	End of Jan. 1980	End of Jan. 1979	Average for end of Jan.	Normal maximum
	Percent of normal maximum				
***MIDCONTINENT REGION*—Continued**					
SOUTH DAKOTA—Continued					
Lake Sharpe (FIP)	103	102	102	96	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	97	95	93	93	477,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	78	80	64	71	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	93	87	78	82	2,378,000 ac-ft
Keystone (FPR)	93	90	83	87	661,000 ac-ft
Tenkiller Ferry (FPR)	97	95	88	88	628,200 ac-ft
Lake Altus (FIMR)	62	64	45	47	134,600 ac-ft
Lake O'The Cherokees (FPR)	77	76	80	78	1,492,000 ac-ft
OKLAHOMA—TEXAS					
Lake Texoma (FMPRW)	91	91	81	87	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	37	36	34	43	386,400 ac-ft
Canyon (FMR)	92	93	102	73	385,600 ac-ft
International Amistad (FIMPW)	121	96	111	83	3,497,000 ac-ft
International Falcon (FIMPW)	96	90	100	76	2,668,000 ac-ft
Livingston (IMW)	100	104	100	79	1,788,000 ac-ft
Possum Kingdom (IMPRW)	87	87	92	96	569,400 ac-ft
Red Bluff (PI)	24	27	33	31	307,000 ac-ft
Toledo Bend (P)	88	92	102	82	4,472,000 ac-ft
Twin Buttes (FIM)	43	42	63	30	177,800 ac-ft
Lake Kemp (IMW)	52	54	58	87	268,000 ac-ft
Lake Meredith (FMW)	28	27	33	37	821,300 ac-ft
Lake Travis (FIMPRW)	87	88	78	79	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	79	45	37	53	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	95	64	83	82	5,022,000 ac-ft
Lake Chelan (PR)	53	38	42	44	676,100 ac-ft
Lake Cushman	99	79	55	83	359,500 ac-ft
Lake Merwin (P)	98	99	98	96	245,600 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	44	50	67	63	1,235,000 ac-ft
Coeur d'Alene Lake (P)	47	35	12	49	238,500 ac-ft
Pend Oreille Lake (FP)	35	34	36	53	1,561,000 ac-ft
IDAHO—WYOMING					
Upper Snake River (8 reservoirs) (MP)	56	66	76	66	4,401,000 ac-ft
WYOMING					
Boysen (FIP)	76	73	73	69	802,000 ac-ft
Buffalo Bill (IP)	50	50	56	64	421,300 ac-ft
Keyhole (F)	75	75	78	44	190,400 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	56	58	49	46	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	3	7	1	15	364,400 ac-ft
Taylor Park (IR)	73	69	57	54	106,200 ac-ft
Colorado–Big Thompson project (I)	65	66	41	54	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell: Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	80	80	63	.....	31,620,000 ac-ft
UTAH—IDAHO					
Bear Lake (IPR)	66	68	71	56	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	59	63	66	53	1,000,000 ac-ft
Hetch Hetchy (MP)	44	57	48	30	360,400 ac-ft
Isabella (FIR)	37	52	43	23	570,000 ac-ft
Pine Flat (FI)	55	76	70	49	1,001,000 ac-ft
Clair Engle Lake (Lewiston) (P)	70	79	63	75	2,438,000 ac-ft
Lake Almanor (P)	60	67	71	47	1,036,000 ac-ft
Lake Berryessa (FIMW)	64	77	71	82	1,600,000 ac-ft
Millerton Lake (FI)	44	77	88	64	503,200 ac-ft
Shasta Lake (FIPR)	75	83	76	70	4,377,000 ac-ft
CALIFORNIA—NEVADA					
Lake Tahoe (IPR)	5	30	12	50	744,600 ac-ft
NEVADA					
Rye Patch (I)	46	53	25	54	194,300 ac-ft
ARIZONA—NEVADA					
Lake Mead and Lake Mohave (FIMP)	87	88	87	66	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	75	76	75	16	1,073,000 ac-ft
Salt and Verde River system (IMPR)	76	84	82	40	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	43	43	26	77	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	39	41	10	28	2,539,000 ac-ft

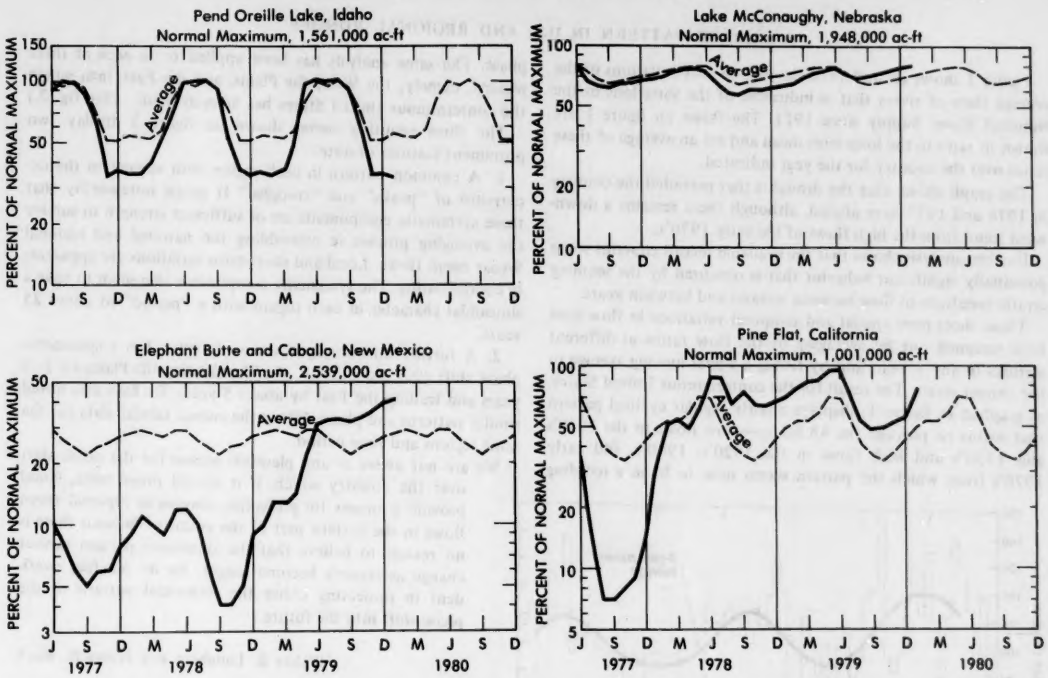
[a] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

FLOW OF LARGE RIVERS DURING JANUARY 1980

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1975 (cfs)	January 1980					
				Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month		
							(cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine	5,690	9,549	2,950	105	-53	1,900	1,230	31
1–3185	Hudson River at Hadley, N.Y	1,664	2,853	1,932	109	-43	1,550	1,000	31
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,630	3,249	71	-23	.....	.....	.....
1–4635	Delaware River at Trenton, N.J	6,780	11,630	7,630	75	-35	5,430	3,510	28
1–5705	Susquehanna River at Harrisburg, Pa	24,100	34,200	23,720	78	-34	12,600	8,140	25
1–6465	Potomac River near Washington, D.C	11,560	[1] 11,190	18,380	160	+33	9,280	6,000	31
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C	4,810	5,007	8,172	156	+117	4,970	3,210	31
2–1310	Pee Dee River at Peedee, S.C	8,830	9,657	16,400	165	+82	23,400	15,100	28
2–2260	Altamaha River at Doctortown, Ga	13,600	13,780	11,600	81	+31	16,400	10,600	27
2–3205	Suwannee River at Branford, Fla	7,880	6,970	4,620	111	-3	4,610	2,980	31
2–3580	Apalachicola River at Chattahoochee, Fla	17,200	22,330	19,300	76	+17	33,400	21,600	31
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	22,570	44,980	155	+52	48,600	31,400	30
2–4895	Pearl River near Bogalusa, La	6,630	9,263	23,050	285	-5	35,000	22,600	31
3–0495	Allegheny River at Natrona, Pa	11,410	[1] 19,210	29,900	135	-8	22,500	14,500	27
3–0850	Monongahela River at Braddock, Pa	7,337	[1] 12,360	12,200	72	-16	12,100	7,820	27
3–1930	Kanawha River at Kanawha Falls, W.Va	8,367	12,530	19,360	124	+39	20,000	12,900	27
3–2345	Scioto River at Higby, Ohio	5,131	4,513	6,590	174	-15	3,740	2,420	28
3–2945	Ohio River at Louisville, Ky[2]	91,170	114,100	154,400	105	-7	134,900	87,200	31
3–3775	Wabash River at Mount Carmel, Ill	28,635	27,030	35,830	162	-22	21,400	13,800	31
3–4690	French Broad River below Douglas Dam, Tenn	4,543	[1] 6,794	10,200	128	+43	.....	.....	.....
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,185	4,390	127	-3	.....	.....	.....
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	241,100	253,500	114	-12	220,000	142,000	31
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,300	5,830	70	-76	24,300	15,700	31
5–0825	Red River of the North at Grand Forks, N. Dak	30,100	2,524	1,373	177	-15	1,270	820	31
5–1335	Rainy River at Manitou Rapids, Minn	19,400	12,950	10,000	108	+4	11,000	7,100	25
5–3300	Minnesota River near Jordan, Minn	16,200	3,412	1,930	397	-48	1,690	1,090	25
5–3310	Mississippi River at St. Paul, Minn	36,800	[1] 10,580	6,760	150	-27	6,190	4,000	24
5–3655	Chippewa River at Chippewa Falls, Wis	5,600	5,110	2,890	105	-10	.....	.....	.....
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,613	7,610	135	+1	.....	.....	.....
5–4465	Rock River near Joslin, Ill	9,551	5,852	9,730	284	+61	7,500	4,850	31
5–4745	Mississippi River at Keokuk, Iowa	119,000	62,570	47,700	144	-9	41,800	27,000	31
6–2145	Yellowstone River at Billings, Mont	11,795	6,986	2,328	90	-17	1,300	840	31
6–9345	Missouri River at Hermann, Mo	524,200	79,750	39,540	120	-29	44,100	28,500	24
7–2890	Mississippi River at Vicksburg, Miss[4]	1,140,500	573,600	667,700	125	-11	667,000	431,000	28
7–3310	Washita River near Durwood, Okla	7,202	1,414	331	72	+37	260	170	31
8–2765	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	724	489	106	+25	500	320	31
9–3150	Green River at Green River, Utah	40,600	6,366	2,031	111	+65	3,400	2,200	31
11–4255	Sacramento River at Verona, Calif	21,257	19,150	50,100	195	+184	54,900	35,500	28
13–2690	Snake River at Weiser, Idaho	69,200	18,170	13,920	93	+27	11,590	7,490	28
13–3170	Salmon River at White Bird, Idaho	13,550	11,290	3,900	93	+4	2,330	1,510	28
13–3425	Clearwater River at Spalding, Idaho	9,570	15,570	8,707	132	-22	11,500	7,430	28
14–1057	Columbia River at The Dalles, Oreg[5]	237,000	194,600	75,600	91	+30	.....	.....	.....
14–1910	Willamette River at Salem, Oreg	7,280	23,810	62,200	112	+72	38,800	25,100	26–31
15–5155	Tanana River at Nenana, Alaska	25,600	23,850	5,484	84	-19	5,000	3,200	31
8MF005	Fraser River at Hope, British Columbia	83,800	96,400	23,200	68	-30	24,900	16,100	25

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, JUNE 1977 TO JANUARY 1980



Near- or above-average contents characterized most reservoirs in the United States during January. Monthend contents of several key reservoirs in the Pacific Northwest, however, were much below-average, including Pend Oreille Lake in northern Idaho. (See graph above.)

WATER RESOURCES REVIEW

January 1980

Based on reports from the Canadian and U.S. field offices; completed February 13, 1980

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for January based on 20 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for January 1980 is compared with flow for January in the 30-year reference period 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for January is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range.* In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the January flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of January. Water level in each key observation well is compared with average level for the end of January determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels,* unless described otherwise, are from the end of December to the end of January.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.

VARIATIONS IN THE NATIONAL WATER SUPPLY—1979 UPDATE (48 CONTERMINOUS STATES)

A MARKED PATTERN IN U.S. AND REGIONAL RUNOFF

Figure 1 shows an update of the year-to-year variations of the average flow of rivers that is indicative of the variations in the National Water Supply since 1911. The flows on figure 1 are shown in ratio to the long-term mean and are an average of these ratios over the country for the year indicated.

The graph shows that the droughts that pervaded the country in 1976 and 1977 have abated, although there remains a downward trend from the high flows of the early 1970's.

Further analysis shows that the available record contains some potentially significant behavior that is obscured by the seeming erratic variations in flow between streams and between years.

These short-term spatial and temporal variations in flow have been screened out by averaging of the flow ratios at different stations in any 1 year, and by fitting a 9-year moving average to the annual series. The result for the conterminous United States, as graphed in figure 1, displays a fairly regular cyclical pattern that seems to pervade the 48 States—low flows in the 1930's and 1950's and high flows in the 1920's, 1940's, and early 1970's from which the pattern seems now to be in a receding phase. The same analysis has been applied to to each of three regions, namely, the West, the Plains, and the East, into which the conterminous United States has been divided. (See fig. 2.)

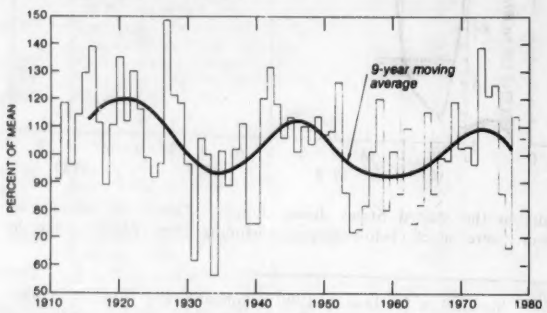

Figure 1.—Graph showing percent of mean streamflow, 1911–1979 and smoothed graph of 9-year moving average.

The three resulting curves shown on figure 3 display two prominent features of note:

1. A common pattern in each region with respect to the occurrence of "peaks" and "troughs." It seems noteworthy that these systematic components are of sufficient strength to survive the averaging process in assembling the national and regional 9-year mean flows. Local and short-term variations are apparently compensating. The systematic components also seem to have a sinusoidal character in each region with a "period" of about 25 years.

2. A further noteworthy feature of figure 3 is a systematic phase shift over the country, the West leading the Plains by 2–3 years and leading the East by about 5 years. We have also noted similar patterns and phase shift in the annual rainfall data for the same regions and time period.

We are not aware of any plausible reason for the phase shift over the country which, if it should prove valid, could provide a means for projecting changes in regional mean flows in the eastern part of the country. Because there is no reason to believe that the sinusoidal pattern cannot change as records become longer, we do not feel confident in projecting either the sinusoidal pattern or the phase shift into the future.

Walter B. Langbein and James R. Slack

[The data on the charts are based on maps showing the flows of about 125 representative rivers in relation to their averages, similar to those published annually in the Water Resources Review and compiled for 1931–1960 in Water-Supply Paper 1669–S]

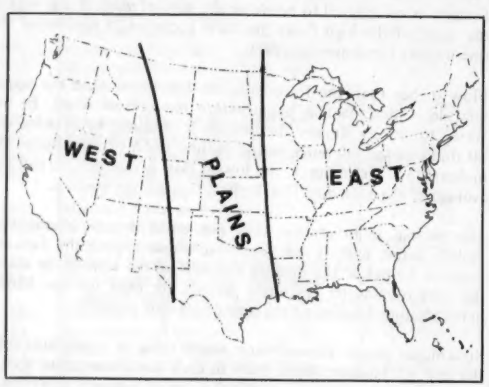

Figure 2.—Map of conterminous U.S. showing division into three regions.

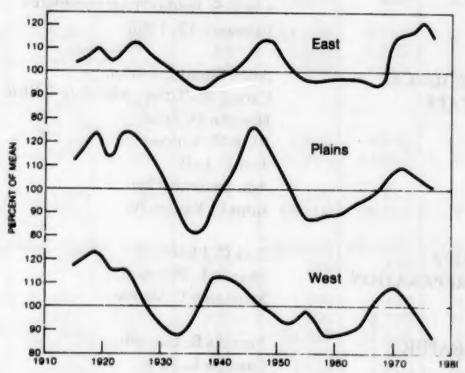

Figure 3.—Graphs showing 9-year moving averages of streamflow in percent of mean, for Eastern, Plains and Western regions.